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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,324	09/25/2003	Vinod Prakash	1864.001US1	5680

40317 7590 09/11/2009

GLOBAL IP SERVICES, PLLC
10 CRESTWOOD LANE
NASHUA, NH 03062

EXAMINER	
GODBOLD, DOUGLAS	

ART UNIT	PAPER NUMBER
2626	

NOTIFICATION DATE	DELIVERY MODE
09/11/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pnama@globalipservices.com
contact@globalipservices.com
neha@globalipservices.com

Office Action Summary	Application No.	Applicant(s)
	10/671,324	PRAKASH ET AL.
	Examiner	**Art Unit**
	DOUGLAS C. GODBOLD	2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 23 July 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,4-6,8-12,15-17,19-26,28,29,31 and 32 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 11 and 20 is/are allowed.

6)☒ Claim(s) 1, 4-6, 8-10, 12, 15-17, 19, 21-26, 28, 29, 31, and 32 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to correspondence filed July 23, 2009 in reference to application 10/671,324. Claims 1, 4-6, 8-12, 15-17, 19-26, 28, 29, 31, and 32 are pending and have been examined.

Response to Amendment

2. The amendment filed June 23, 2009 has been accepted and considered in this office action. Claims 1, 5, 11, 12, 17, 20, 21, 25, 26, and 31 have been amended, and claim 30 has been cancelled. The rejections under 35 U.S.C. 101 have been withdrawn.

Response to Arguments

3. Applicant's arguments filed July 23, 2009 have been fully considered but they are not persuasive.

4. Regarding applicants arguments, see Remarks page 10 and again on page 14, that Fiocca does not teach or suggest that "local gain of the scale band factor are estimated as a function of band energy ratios and SMR's, the examiner respectfully disagrees. While examiner agrees that the calculations in Fiocca are based on MNR's, it is noted that in column 4 line 60, the MNR is defined as being dependent on the SNR of the sub-band. Therefore the local gain is a function of at least the SMR.

5. Applicants further ague, see Remarks pages 10 and 11, that Fiocca does not teach the "energy ratios" defined by the limitations added to the claims: "energy ratios are computed by dividing energy in each band over the sum of the energies in all the bands." However it is noted that Fiocca discusses the use of such a ratio when determining the masking level in each subband (see column 4 lines 40-49). Here Fiocca discusses the relationship between energy in one subband with the energy in "the other sub bands", and a comparison must be made in order to determine the masking. This comparison would lead to a "relative energy" for the sub-band in question. This also would be a ratio, because the action of determining the greater number is in essence determining a ratio. Because this comparison is made to determine masking, which is then in turn used to allocate bits, Fiocca therefore teaches the energy ratios being used to determine the scale band factors. Although not cited in the rejection, applicant is made aware of US Patent 4,790,015, which discusses determining a "relative" energy level for each sub-band by dividing the energy in a sub-band by the energy in other sub bands, and using this information for bit allocation.

6. Applicants argue, see Remarks page 11, that Fiocca does not specifically teach that the difference between the SMR and SNR in each scale band factor would be "substantially constant" however the examiner respectfully disagrees. This difference is the same calculation (MNR) that is made in column 4 line 60. When the look described in lines 54-67 is started, the MNR for each sub-band will be at its highest difference. As bits are allocated to each sub-band based on the *Lowest MNR*, it would be obvious that

the MNR's of all the sub-bands would be closer together, i.e., more *substantially constant* than the MNR's at the beginning of the loop. Therefore Fiocca teaches difference between the SMR and SNR in each scale band factor would be "substantially constant."

7. Applicants argue, see Remarks page 12, that Fiocca does not teach "assigning quantization precision to each scale band factor that is inversely in proportion to their energy content with respect to frame energy to desensitize the scale factor bands," the examiner respectfully disagrees. Applicant argues that the limitations should be interpreted in such as way the precision is assigned higher in the case that surrounding bands' energies are higher. However, the examiner believes that this interpretation is opposite the first limitation of the claim " assigning a higher quantization precision to scale band factors having a high SMR." Generally, a high SMR indicates that particular sub-band is louder than the surrounding sub-bands. Given this, the first limitation basically is saying that more bits are assigned to bands who's surrounding bands' energies are *lower*. Therefore, in order to avoid issues with U.S.C. 112, the examiner will read "assigning quantization precision to each scale band factor that is inversely in proportion to their energy content with respect to frame energy to desensitize the scale factor bands" to mean inversely proportional to the relative loudness of surrounding bands (i.e. higher quantization for a band, if surrounding sub-bands are lower than current subband energy). As shown in the previous rejection, Fiocca does teach the limitations with this interpretation.

Claim Objections

8. Claim 17 is objected to because of the following informalities: “coupled a processor” should be “coupled to a processor”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 4-6, 8, 10, 12, 15-17, 19, 21, 23, 25, and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Fiocca (US Patent 5,732,391).

11. Consider claim 1, Fiocca teaches a method for real-time encoding of an audio signal in an audio encoder (abstract) comprising:

grouping spectral lines to form scale band factors by determining masking thresholds based on human perception system using a time-to-frequency transform module of the audio encoder(MPEG filter bank 102, and masking in each subband based on psychoacoustics, column 3 lines 13-35);

shaping quantization noise in spectral lines in each scale band factor using local gain using a quantizer coupled to a processor in the audio encoder (bit allocation

column 4 lines 50-67), wherein the local gain of the scale band factor are estimated as a function of band energy ratios and SMRs (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain), wherein the shaping the quantization noise in each scale band factor such that a difference between SMR and SNR in each scale band factor is substantially constant (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. inherently after loop is run, the MNR will be more constant); and wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49) and

running a loop for each scale band factor to satisfy a predetermined bit allocation rate based on a bit allocation scheme using an inner loop module of the audio encoder (step 6, repeat iteration, column 4 lines 66-67.).

12. Consider claim 4, Fiocca teaches the method of claim 1, wherein shaping the quantization noise in each scale band factor such that the difference between SMR and SNR is substantially constant comprises:

assigning a higher quantization precision to scale band factors having a high SMR (more bits allocated to bands with higher SNR, column 3 line 30); and

assigning a quantization precision to each scale band factor that is inversely in proportion to their energy content with respect to frame energy to desensitize the scale

factor bands (fewer bits are assigned to subbands where surrounding subbands have more energy; column 4 lines 42-44).

13. Consider claim 5, Fiocca teaches a single-loop quantization method for band-by-band system (abstract, and figure 2) comprising:

calculating local gain for each band using a quantizer coupled to a processor in the audio encode (step 201, initial bit allocation for each subband, column 4 line 7-12. Initial bit allocation determines quantization resolution, which is local gain.); and

shaping quantization noise in each band r using local gain (bit allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy ratios and SMRs (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain), wherein the shaping the quantization noise in spectral lines in each band such that a difference between Signal-to-Mask Ratio (SMR) and Signal-to-Noise Ratio (SNR) in each band is substantially constant (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. inherently after loop is run, the MNR will be more constant.), wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49)

14. Consider claim 6, Fiocca teaches the method of claim 5, wherein shaping the quantization noise in each band using its local gain comprises:

shaping the quantization noise in each band by setting a scale factor in each band based on its psychoacoustic parameters and energy ratio (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain. Masking levels are based on psychoacoustics; column 2 lines 50-53).

15. Consider claim 8, Fiocca teaches the method of claim 5, wherein the spectral lines are derived by performing a time to frequency transformation of the audio signal (filter bank transforms time domain signals to frequency domain signals; column 3 lines 12-22).

16. Consider claim 10, Fiocca teaches the method of claim 5, wherein shaping quantization noise in each band such that the difference between SMR and SNR is substantially constant comprises:

assigning a higher quantization precision to bands having a higher SMR (more bits allocated to bands with higher SNR, column 3 line 30); and

further assigning quantization precision to each band such that the assigned quantization precision is inversely in proportion to their energy content with respect to band energy to desensitize the bands (fewer bits are assigned to subbands where surrounding subbands have more energy; column 4 lines 42-44).

17. Consider claim 12, Fiocca teaches a method for encoding an audio signal in an audio coder (abstract, and figure 2), based on a perceptual model (psychoacoustic model, column 2 lines 50-53), comprising quantization noise shaping of spectral lines on a band-by-band basis using local gain using a quantizer coupled to a processor in the audio encoder (bit allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy ratios and SMRs (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain) such that a difference between SMR and SNR is held substantially constant for each band, wherein the energy ratios are computed by dividing energy in each band over sum of energies in all bands (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. Inherently after loop is run, the MNR will be more constant.).

18. Consider claim 15, Fiocca teaches the method of claim 12, wherein shaping quantization noise in each band such that the difference between SMR and SNR is substantially constant comprises:

assigning a higher quantization precision to bands having a higher SMR (more bits allocated to bands with higher SNR, column 3 line 30); and

further assigning quantization precision to each band such that the assigned quantization precision is inversely in proportion to their energy content with respect to

band energy to desensitize the bands (fewer bits are assigned to subbands where surrounding subbands have more energy; column 4 lines 42-44).

19. Consider claim 16, Fiocca teaches the method of claim 15, wherein fitting the noise shaped spectral lines comprises:

estimating a bit demand for each band (figure 2, steps 200—203, bits allocated to sub bands); and

allocating the estimated bit demand based on a predetermined bit rate (column 4 line 67, bit allocation ends when no more bits are available, i.e. max bit rate reached).

20. Consider claim 17, Fiocca teaches an apparatus comprising an encoder including a quantizer coupled a processor (audio compression system, abstract) to quantize an audio signal based on a perceptual model (psychoacoustic model, column 2 lines 50-53) comprising quantization noise shaping of spectral lines on a band by-band basis using local gain (bit allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy and SMRs and fitting spectral lines within each band based on a given bit rate (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain), wherein the quantization noise shaping the spectral lines on the band-by-band basis such that the difference between SMR and SNR is substantially constant in each band (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67.

Inherently after loop is run, the MNR will be more constant.) wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49)

21. Consider claim 19, Fiocca teaches the apparatus of claim 17, wherein the local gains are derived from energy ratios and SMRs in each band (MNR is an energy ratio based on SMR, and bits are allocated to lowest MNR, bit allocation being local gain; column 4 lines 50-67.).

22. Consider claim 21, Fiocca teaches an apparatus for coding a signal (audio compression system, abstract) based on a perceptual model (psychoacoustic model, column 2 lines 50-53) wherein the apparatus includes an audio encoder including a quantizer coupled to a processor, comprising:

means for shaping quantization noise in spectral lines on a band-by-band basis using local gain using the processor (allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy ratios and SMRs (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain), wherein the means for shaping quantization noise in the spectral lines such that the difference between SMR and SNR is substantially constant for each band (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-

67. Inherently after loop is run, the MNR will be more constant.) wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49); and

means for quantizing the shaped spectral lines in each band based on a predetermined bit rate (column 4 line 67, bit allocation ends when no more bits are available, i.e. max bit rate reached).

23. Consider claim 23, Fiocca teaches the apparatus of claim 21, wherein means for quantizing of the spectral lines comprises:

means for estimating a bit demand for each band (figure 2, steps 200—203, bits allocated to sub bands); and

means for allocating the estimated bit demand based on a predetermined bit rate (column 4 line 67, bit allocation ends when no more bits are available, i.e. max bit rate reached).

24. Consider claim 25, Fiocca teaches an audio encoder (audio compression system, abstract) comprising a quantizer to shape quantization noise in spectral lines in each band using local gain (allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy ratios and SMRs and to further run a loop to fit the shaped spectral lines in each band within a predetermined bit rate

(masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain) wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49);

a noise shaping module to shape the quantization noise in each band such that a difference between SMR and SNR is held substantially constant in each band (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. Inherently after loop is run, the MNR will be more constant.); and

an inner loop module to fit shaped band within the predetermined bit rate (loop described column 4 lines 50-67, last step checks to see if within predetermined bit rate).

25. Consider claim 28, Fiocca teaches an article comprising:

a storage medium having instructions that, when executed by a computing platform (using a Motorola DSP chip is described in column 3 line 36. It is inherent that some memory must be used in order to store instructions for the processor to function.), result in execution of a method comprising:

encoding an audio signal, based on a perceptual model, by noise shaping spectral lines on a band-by-band basis using their local gains (allocation column 4 lines 50-67), wherein the local gain of the band are estimated as a function of band energy rations and SMRs (masking to noise ratio is used to determine where bits are allocated,

steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain), such that the difference between SMR and SNR is held substantially constant for each band (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. Inherently after loop is run, the MNR will be more constant.) wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49).

26. Consider claim 29, Fiocca teaches the article of claim 28, wherein the local gains are derived from energy ratios and SMRs in each band (MNR is an energy ratio based on SMR, and bits are allocated to lowest MNR, bit allocation being local gain; column 4 lines 50-67.).

Claim Rejections - 35 USC § 103

27. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

28. Claims 9, 22, 26, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fiocca in view of Davidson (US Patent 6,246,345).

29. Consider claim 9, Fiocca teaches the method of claim 5, further comprising:

computing local gain for each band (step 201, initial bit allocation for each subband, column 4 line 7-12. Initial bit allocation determines quantization resolution, which is local gain).

Fiocca does not specifically teach:

partitioning the audio signal into a sequence of successive frames; and

forming bands including groups of neighboring spectral lines for each frame based on critical bands of hearing.

In the same field of perceptual audio coding, Davidson teaches:

partitioning the audio signal into a sequence of successive frames (In preferred embodiments, the bank of filters is implemented by weighting or modulating overlapped blocks of digital audio samples with an analysis window function; column 4, line 45); and

forming bands including groups of neighboring spectral lines for each frame based on critical bands of hearing (In FIG. 1, analysis filter bank 12 receives an input signal from path 11, splits the input signal into subband signals representing frequency sub-bands of the input signal... it is common for a split-band encoder and decoder in a perceptual coding system to process many more sub-bands having bandwidths that are commensurate with the critical bandwidths of the human auditory system; column 4, line 30-39).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to complete the steps of windowing and creating subbands based on critical bands as taught by Davidson in order to facilitate the system of Fiocca, as

windowing is required for filter banks of Fiocca to operate properly, and sub-bands must be determined as well before the allocation scheme is enacted.

30. Consider claim 22, Fiocca teaches the apparatus of claim 21, further comprising:

means for performing time-to-frequency transformation to obtain the spectral lines in each frame (filter bank transforms time domain signals to frequency domain signals; column 3 lines 12-22).

Fiocca does not specifically teach:

means for partitioning the signal into a sequence of successive frames; and

means for forming bands by grouping neighboring spectral lines within each frame.

In the same field of perceptual audio coding, Davidson teaches:

means for partitioning the signal into a sequence of successive frames (In preferred embodiments, the bank of filters is implemented by weighting or modulating overlapped blocks of digital audio samples with an analysis window function; column 4, line 45); and

means for forming bands by grouping neighboring spectral lines within each frame (In FIG. 1, analysis filter bank 12 receives an input signal from path 11, splits the input signal into subband signals representing frequency sub-bands of the input signal... it is common for a split-band encoder and decoder in a perceptual coding system to process many more sub-bands having bandwidths that are commensurate with the critical bandwidths of the human auditory system; column 4, line 30-39).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to complete the steps of windowing and creating subbands based on critical bands as taught by Davidson in order to facilitate the system of Fiocca, as windowing is required for filter banks of Fiocca to operate properly, and sub-bands must be determined as well before the allocation scheme is enacted.

31. Consider claim 26, Fiocca teaches the audio encoder of claim 25, further comprising:

a time-to-frequency transformation module to obtain the spectral lines in each frame, wherein the time-to-frequency transformation module to form bands by grouping neighboring spectral lines with each frame (filter bank transforms time domain signals to frequency domain signals; column 3 lines 12-22).

Fiocca does not specifically teach:

an input module to partition an audio signal into a sequence of successive frames.

In the same field of perceptual audio coding, Davidson teaches:

an input module to partition an audio signal into a sequence of successive frames (In preferred embodiments, the bank of filters is implemented by weighting or modulating overlapped blocks of digital audio samples with an analysis window function; column 4, line 45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to complete the steps of windowing and creating subbands based on

critical bands as taught by Davidson in order to facilitate the system of Fiocca, as windowing is required for filter banks of Fiocca to operate properly, and sub-bands must be determined as well before the allocation scheme is enacted.

32. Consider claim 31, Fiocca teaches a system (audio compression system, abstract) comprising:

a processor (Motorola processor column 3 line 37);

a memory coupled to the processor (using a Motorola DSP chip is described in column 3 line 36. It is inherent that some memory must be used in order to store instructions for the processor to function);

an audio encoder comprising a quantizer coupled to and the processor to shape quantization noise in spectral lines in each band using local gain (allocation column 4 lines 50-67), wherein the local gain of the scale band factor are estimated as a function of band energy ratios and SMRs (masking to noise ratio is used to determine where bits are allocated, steps 2 and 3, column 4 lines 50-67. Increasing bit assignment increases bit resolution, which is analogous to local gain) and to further run a loop to fit the shaped spectral lines in each band within a predetermined bit rate (column 4 line 67, bit allocation ends when no more bits are available, i.e. max bit rate reached) wherein the energy ratios are commuted by dividing energy in each band over sun of energies in all bands (masking level is determined in part by the ratio of a band energy with that of surrounding bands in order to determine auditory importance, column 4 lines 40-49);

a noise shaping module to shape the quantization noise in each band such that a difference between SMR and SNR is held substantially constant in each band; and an inner loop module to fit shaped band within the pre-determined bit rate (MNR is difference in question, and bits are allocated to lowest MNR; column 4 lines 50-67. Inherently after loop is run, the MNR will be more constant.).

Fiocca does not specifically describe:

a bus;

the processor couples to the bus; and

a network interface coupled to the processor and the memory.

In the same field of perceptual audio coding, Davidson teaches

a bus (bus 91);

a processor coupled to the bus (DSP 92); and

a network interface coupled to the processor and the memory (I/O control 95 represents interface circuitry to receive and transmit audio signals by way of communication channel 96; column 20, line 25).

Therefore it would have been obvious to one of ordinary skill in the art to use a computer system as described by Davidson as a means of executing the method of Fiocca in order to allow for the method to be executed on a general computing platform.

33. Consider claim 32, Fiocca teaches the system of claim 31, further comprising:

a time-to-frequency transformation module to obtain the spectral lines in each frame, wherein the time-to-frequency transformation module to form bands by grouping

neighboring spectral lines with each frame (filter bank transforms time domain signals to frequency domain signals; column 3 lines 12-22).

Fiocca does not specifically teach:

an input module to partition an audio signal into a sequence of successive frames.

In the same field of perceptual audio coding, Davidson teaches:

an input module to partition an audio signal into a sequence of successive frames (In preferred embodiments, the bank of filters is implemented by weighting or modulating overlapped blocks of digital audio samples with an analysis window function; column 4, line 45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to complete the steps of windowing and creating subbands based on critical bands as taught by Davidson in order to facilitate the system of Fiocca, as windowing is required for filter banks of Fiocca to operate properly, and sub-bands must be determined as well before the allocation scheme is enacted.

Allowable Subject Matter

34. Claims 11 and 20 are allowed. The following is an examiner's statement of reasons for allowance:

The Prior art of record does not teach or fairly suggest alone or in combination the following equations used for deriving local gains:

$$K_b = -(int)(\alpha * \log2(en(b)/sum\_en) + \beta * \log2(SMR(b)))$$

wherein K6 is the local gain for each band, log2 is logarithm to base 2, en(b) is the band energy in band b, sum en is total energy in a frame, SMR(b) is the psychoacoustic threshold for band b, wherein a measures weightage due to energy ratio, and fl is a weightage due to SMRs.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

35. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DOUGLAS C. GODBOLD whose telephone number is (571)270-1451. The examiner can normally be reached on Monday-Thursday 7:00am-4:30pm Friday 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DCG
/Richemond Dorvil/
Supervisory Patent Examiner, Art Unit 2626